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Suicide Mortality in Al-Sharqia Governorate, Egypt

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Abstract **Background:** Suicides are a global public health issue affecting all ages, races and social classes, causing significant economic, cultural, public and psychological consequences in adults and adolescents. **Aim:** The study analyzes data from 2023 suicide victims in Al-Sharqia Governorate, Egypt, focusing on characteristics and methods of suicide. A retrospective study conducted by Egypt's Forensic Medicine Authority in 2023 reviewed 580 autopsy cases to investigate patterns in suicide-related deaths. The analysis focused on variables including age, gender, socioeconomic status, location, suicide methods and history. **Results:** Of the total cases, 206 (35.5%) were identified as suicides, corresponding to an incidence rate of 2.26 per 100,000 population. Most victims were male (71%) and primarily in their 30s and 40s (56%). The leading method of suicide was poisoning with metal phosphide tablets, reported in 63.6% of cases. **Conclusion:** The study found that suicide cases were over a third of autopsies, primarily in rural low-income areas due to phosphide poisoning. Female teens self-harm more than males. More research is needed, as suicide mainly affects the working population, leading to significant community loss. Urgent public health action is needed to address suicide in vulnerable populations. The data revealed that suicide was most prevalent among young adult males, with phosphide poisoning emerging as the predominant method.

Key Words Suicide, Phosphide Poisoning, Socioeconomic Factors, Forensic Medicine

INTRODUCTION

The World Health Organization (WHO) defines suicide as an act deliberately initiated and completed by an individual who fully comprehends its fatal outcome. Suicide is a critical public health concern affecting people of all ages, backgrounds and social classes. It is also a leading cause of death among adolescents and adults [1].

The consequences of suicide are far-reaching-psychological, cultural, social and economic. Each year, over 800,000 people worldwide die by suicide, with many more attempting it [2]. WHO has identified numerous contributing risk factors, including mental illness, chronic health conditions, interpersonal and financial difficulties, hopelessness, low self-esteem, socio-cultural pressures and social isolation.

Although Egypt's reported suicide rate is lower than the global average, recent figures show a noticeable increase in cases. This rise may reflect actual trends or improved detection, but underreporting remains a concern. Cultural and religious stigma often leads families to conceal suicide due to fear of social shame, contributing to inaccurate statistics. These factors, along with limited mental health awareness and surveillance, may obscure the true scale of the problem [3].

Aim of the Study

This study analyzes the profile of suicide cases in Al-Sharqia Governorate, Egypt, during 2023. It aims to:

- Identify the demographic and social characteristics of suicide victims, including age, gender and socioeconomic status
- Examine the methods used to commit suicide
- Investigate any history or signs of previous suicide attempts
- Understand local suicide patterns to help guide future prevention strategies

METHODS

This retrospective study was conducted at the Forensic Medicine Authority, Ministry of Justice, Al-Sharqia Governorate, Egypt. Al-Sharqia is the third most populous

governorate in Egypt, located in the northern region, with Zagazig as its capital. The governorate has a poverty rate exceeding 60% and an estimated population of 7,859,068 as of January 2023. According to 2015 data, approximately 76.9% of the population lived in rural areas, with an urbanization rate of 23.1% [4].

Data were collected by forensic examiners, from autopsy files of deceased individuals referred to forensic department of ministry of justice, suspected of suicide during 2023. Among 580 autopsy cases, 206 (35.5%) were confirmed as suicides after comprehensive evaluation. The retrospective design is suitable for medicolegal investigations as it allows analysis of existing forensic records without direct participant involvement.

The study included only cases where suicide was clearly established through legal and forensic evidence, such as investigations, autopsies, toxicology and medicolegal conclusions. Cases with unclear causes or lacking sufficient proof of suicide, including possible accidents or homicides, were excluded unless strong supporting evidence-like suicide notes, psychiatric history, witness testimony, or forensic findings-confirmed suicidal intent. This strict selection ensured the analysis focused solely on confirmed suicides for accuracy and reliability. When direct evidence was absent, suicide was confirmed through careful assessment of circumstantial factors like the scene, motives, injury patterns, toxicology and lack of third-party involvement. Only when these indicators collectively supported self-inflicted death was suicide officially classified.

Victim anonimized data were analyzed and included age (grouped by decades), gender, socioeconomic status, location of suicide, suicide methods, history of prior attempts and toxicology results. Grouping by decade and method of death enabled detailed demographic and epidemiological analysis.

Ethical Considerations

The study adhered to the Declaration of Helsinki and received ethical approval from the Non-Interventional Ethics Committee of Al-Azhar University, Faculty of Medicine (approval number 0000018; date: 24 June 2024). As the study used anonymized retrospective data, informed consent was waived.

Statistical Analysis

Statistical analyses were conducted using SPSS software version 23.0.

RESULTS

Three key risk patterns characterized the suicide cases in Al-Sharqia Governorate during 2023:

- Male predominance, representing 62% of cases
- Highest incidence among individuals aged 30 to 49 years
- Poisoning with metal phosphide tablets as the leading method, accounting for 63.6% of suicides

Among 580 autopsied cases in 2023, 206 (35.5%) were confirmed suicides, yielding an incidence rate of 2.26 per 100,000 population.

Gender Distribution

Males accounted for 128 cases (62%), while females represented 78 cases (38%) (Figure 1).

Age and Gender

The youngest male suicide victim was 13 years old (one case), compared to 15 years for females (three cases). Females outnumbered males only in the 11-20 age group; in all other groups, males predominated. The highest number of suicides occurred in the 30-49 age range (116 cases, 56%), including 73 males and 43 females (Figure 2).

Gender and Suicide Method

Poisoning with metal phosphide tablets was the most common suicide method, accounting for 131 cases (63.6%), followed by hanging with 42 cases (20.4%). Self-burning was the least frequent method. Among females, 68 cases involved aluminum phosphide poisoning, compared to 63 males. Hanging was predominantly a male method (39 males versus 3 females) (Figure 3).

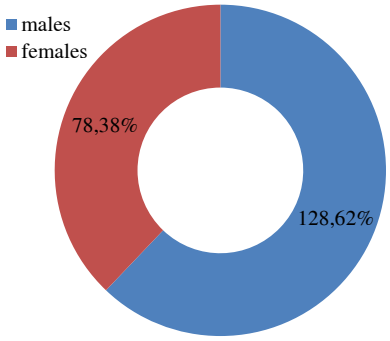

Figure 1: Gender Distribution of Suicide Cases in 206 Cases in Al-Sharqia Governorate, Egypt, 2023

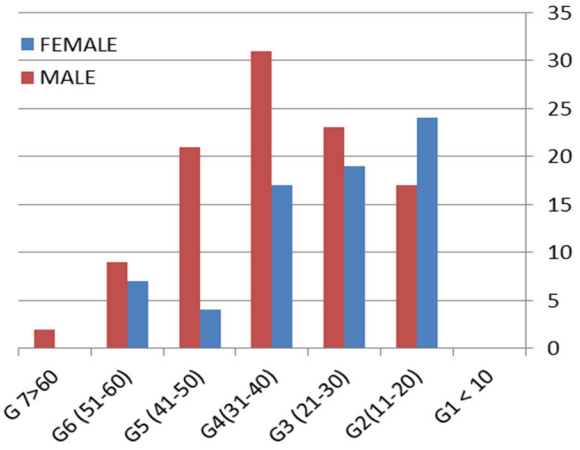

Figure 2: Age Group Distribution of Suicide Cases Across Genders in 206 Cases in Al-Sharqia Governorate, Egypt, 2023

Table 1: Distribution of Suicide Methods Across Age Groups in 206 Cases in Al-Sharqia Governorate, Egypt, 2023

Age group	Methods				p-value
	Hanging N(%)	Metal Phosphide N(%)	Drowning N(%)	Burn N(%)	
G1 (<11 Y)	No cases				0.14
G2 (11-20 Y)	10(4.9%)	41(20%)	9(4.3%)	0(0%)	
G3 (21-30 Y)	16 (7.8%)	30(14%)	6(3.4%)	0(0%)	
G4 (31-40 Y)	4(2%)	6(7.3%)	6(3%)	0(0%)	
G5 (41-50 Y)	3(1.5)	14(6.8%)	4(2%)	1(0.5%)	
G6 (51-60 Y)	0(0%)	1(0.5%)	1(0.5%)	0(0%)	
G7 (>60 Y)	42(20.4%)	131(63.6%)	30(14.5%)	1(0.5%)	

Note: Metal phosphide poisoning is the most prevalent method among individuals in the third and fourth decades of life. The Chi-square test yielded a p-value 0.140, indicating no statistically significant association between age group and method of suicide (p>0.05)

Table 2: Demographic Characteristics of Suicide Cases Across Age Groups in 206 Cases in Al-Sharqia Governorate, Egypt, 2023

Age group	Demographic distribution				
	Place		Socioeconomic		
	Home N(%)	Canal N(%)	High N(%)	Intermediate N(%)	Low N(%)
G1 (<10 Y)	No cases				
G2 (11-20 Y)	39(19%)	2(1%)	3(1.4%)	22(10.6%)	16(7.7%)
G3 (21-30 Y)	52(25.3%)	9(4.3%)	4(1.9%)	27(13.1%)	29(14%)
G4 (31-40 Y)	46(22.3%)	8(3.8%)	2(1%)	20(9.6%)	33(16%)
G5 (41-50 Y)	19(9.2%)	6(2.9%)	1(0.5%)	11(5.3%)	13(6.3%)
G6 (51-60 Y)	18 (8.7%)	4(2%)	1(0.5%)	9(4.3%)	13(6.3%)
G7 (>60 Y)	2(1%)	1(0.5%)	0(0%)	0(0%)	2(1%)
Total	176 (85.5%)	30(14.5%)	11(5.5%)	89(43%)	106(51.5%)

Note: The highest number of suicides occurred among individuals with a low socioeconomic status (51.5% of cases), followed by moderate socioeconomic status (43%), with only 5.5% of cases in the high socioeconomic bracket

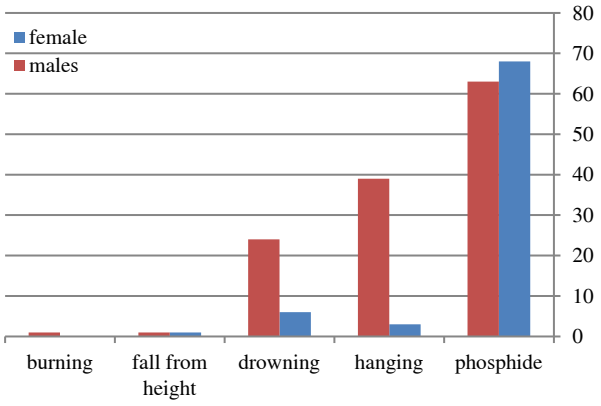

Figure 3: Bar Chart- Methods of Suicide Across Genders in 206 Cases in Al-Sharqia Governorate, Egypt, 2023

Method and Age

Table 1 shows that poisoning with metal phosphide tablets was most prevalent among individuals in their 30s and 40s, corresponding to the age group with the highest suicide incidence.

Demographic and Socioeconomic Distribution

Most victims had no known history of prior suicide attempts, with only two documented repeat cases. The vast majority of suicides (85.5%) occurred at home. Suicide was more common among individuals from lower socioeconomic backgrounds, with over half (51.5%) from low-income groups, 43% from moderate and only 5.5% from high socioeconomic status (Table 2).

DISCUSSION

Suicide rates vary across countries, age groups and gender, especially in developing countries. The worldwide suicide fatality rate is 9.0 per 100,000 population for both genders combined, with males at 12.6 and females at 5.4 per 100,000. The highest rates were reported in Africa (11.2), while the Eastern Mediterranean region showed the lowest rates (6.4) [1,5].

This study identified 206 suicide victims (35.5%) out of 580 referred cases to the Forensic Medicine Authority, Ministry of Justice, Al-Sharqia Governorate, Egypt, during 2023, with a suicide rate of 2.26 per 100,000 population. Previous Egyptian studies found lower rates, such as 0.73 per 100,000 in Cairo [6] and 0.6 to 0.8 per 100,000 in Upper Egypt [7]. Rezaeian and Khan [8] reported a doubling of self-harm deaths between 1990 and 2015 in the Eastern Mediterranean Region, which includes Egypt. Similarly, Qin *et al.* [9] observed rising suicide rates in Muslim-majority countries between 2000 and 2019. Globally, suicide causes approximately 800,000 deaths annually and is the second leading cause of death among adolescents [10].

Our findings showed that males accounted for 62% of suicide cases (128 cases) and females for 38% (78 cases). The youngest male victim was 13 years old, while the youngest female was 15 years old. Notably, in the 11-20 age group, females outnumbered males, a trend not seen in other age groups. The highest number of victims was found in the 3rd and 4th decades of life, with males predominating (73 males and 43 females, totaling 116 cases or 56%). These results align with Taha *et al.* [6], who reported a peak in suicidal deaths among middle-aged individuals. Rohym [11]

also found the majority of suicide victims were aged 21-30 years (32.2%), with males representing 67.2%. De Simone *et al.* [1] observed male predominance in the 20-30 year age group, while Ilic and Ilic [5] and Abdel Moneim *et al.* [7] reported higher suicide mortality among men across all ages. Suicide remains the second most frequent cause of death in young people, especially among males and the elderly [12].

Regarding methods, poisoning by metal phosphide tablets was the most common (131 cases, 63.6%), followed by hanging (42 cases, 20.4%), with self-burning being the least frequent. Females predominantly chose aluminum phosphide tablets (68 cases) compared to males (63 cases). Hanging victims were mostly male (39 males vs. 3 females). Suicide methods vary by country and culture; Bidaki *et al.* [13] reported diverse techniques worldwide including hanging, poisoning, self-immolation and others. Bork *et al.* [2] found aluminum phosphide poisoning was the leading method (25.4%), followed by hanging (19.4%) and falls from height (15.5%). Konieczna *et al.* [12] noted hanging as most common, with males favoring hanging and firearms and females more frequently using self-poisoning and drowning. Phosphide poisoning was predominant in victims under 18 years old [14].

Male-to-female ratio among aluminum phosphide poisoning cases was approximately 2:1, mainly affecting the 16-25 year age group [15]. Aluminum phosphide is a low-cost pesticide commonly used in suicides [16]. Study reported that 53% of such cases were women aged 20-30 years. Abdel Moneim [7] found toxins accounted for 70% of suicides, followed by burns (13%), drowning (6%), falls (6%), hanging (4%) and firearms (2%). De Simone *et al.* [1] and Skorupa *et al.* [17] identified hanging as the leading method, followed by jumping from heights, predominantly among males. Study reported men commonly use hanging, whereas women more often use poisoning or burning.

Most cases in our study had no history of previous suicide attempts, with only two cases reporting prior attempts. Bork *et al.* [2] also found that most suicides occurred at home, similar to our findings where 85% occurred in the home environment.

Finally, our results highlight the impact of socioeconomic status on suicide rates. Low socioeconomic levels were associated with higher suicide incidence (51.5%), likely due to poverty and related pressures. Moderate socioeconomic status also showed substantial cases (43%), reflecting ongoing economic stresses. High socioeconomic status had fewer cases (5.5%). Qin *et al.* [9] linked suicide victims to factors such as physical illness, low income, unemployment and psychiatric disorders, emphasizing that socioeconomic and health challenges in midlife are closely tied to suicide risk.

CONCLUSIONS

The current study demonstrated that suicide rates, particularly from phosphide poisoning, are high in rural low socioeconomic regions and account for almost one-third of autopsied cases. Adolescent girls are more likely than boys to self-harm. Similar research ought to be conducted at the same time. Suicide mostly impacts those who are able to work, which results in significant losses for the community. Thus, every effort should be focused on finding solutions to issues in order to lower the suicide rate in our community. For a more accurate assessment, more extensive investigation is required.

Limitations

- The current study has potential limitations. This is a single governorate study that cannot be generalized, but still, it is a big governorate representing lower Egypt, the most crowded area in population
- The study period is one year only, which might not represent the full nature of the problem
- Many suicidal cases, especially by wheat pellets, depend on circumstantial evidence only, as toxicological tests were not available
- Common root causes of the limitations are personnel, procedures of examination and documentation and the environment to conduct thorough documentation of findings

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